Developing Water-in-Oil Emulsions for Chocolate Products

Steps toward developing heat-resistant chocolate.

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The sale and consumption of chocolate in warmer climates is limited because of the negative effects of heat on the appealing chocolate characteristics. Thus the development of a chocolate product with increased heat resistance is extremely desirable within the confectionery community. This issue has been approached from many different directions, including incorporating fats with higher melting points, increasing the viscosity of the continuous phase and developing a sugar skeleton through the incorporation of water in some form. The following PMCA-funded study conducted at the Pennsylvania State University investigated the latter approach using a relatively new technique, crossflow membrane emulsification, to create water-in-oil emulsions that were then incorporated into a model chocolate system.

Conditions for producing stable and unstable emulsions suitable for use in chocolate were identified. Two methods for examining heat-resistance capacity were codified and used to evaluate the model chocolate samples.

The method of water addition was shown to influence the heat-resistance characteristics of the product. Samples with water added via a stable emulsion showed the most increase in the heat-resistance characteristics measured in this study.

While the products produced do not represent a perfect solution to the issue of heat-resistant chocolate, the application of the crossflow membrane emulsification technology shows promise within this field. The paper will detail possible applications to real world use as well as further testing avenues to be explored. With continued exploration, this and similar research could set the foundation for the development of a heat-resistant chocolate that can be enjoyed by those in the warmer regions of the world.

BACKGROUND

When normal chocolate is exposed to temperatures above the melting point of the fat, the product will become soft, lose its snap and stick to fingers and the wrapper. Additionally, when melted chocolate is cooled again, the fat has now lost its temper and can recrystallize into unstable polymorphic forms, resulting in chocolate bloom. These issues result in low chocolate sales in warmer regions of the world where snacks and sweets are typically sold in traditional

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